Interactive comment on "Optimization shallow groundwater quality by the application of photocatalysis treatment technique in El Obour city, Egypt" *by* El-Montser M. Seleem et al.

Anonymous Referee #1

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This paper deals with the problem of the groundwater resources at El Obour city, Egypt due to the collection of shallow groundwater and the injection of this water into the underline Miocene aquifer. Authors found that this shallow groundwater had a viable count of heterotrophic bacteria, total coliform, fecal coliform and fecal streptococci. The aim of this research article from Introduction Section is to find the optimal solution for the protection of the area from waterlogging environmental impacts through, determine the water quality from the 5 different drilled wells. In addition, Application of advanced photocatalytic techniques for water treatment by using nitrogen-doped TiO2 photocatalyst using solar light. The paper is relevant to the scope of the journal. However, authors fail to show how to apply the photocatalytic technique for treatment of the collected

shallow groundwater. Therefore, this paper could not publish in Drink. Water Eng. Sci. journal in the current quality. This decision is according to the following comments: (1) The word "Optimization" in the title appears to be for the quality of shallow groundwater, while authors aimed to find the optimal solution for the protection of the area from this contaminated shallow groundwater (Page 3, Line 5). Thus, the title is not understandable in terms of doing the optimization for the water treatment or for the selection of the best solution. (2) In the Abstract, authors mentioned that the main pollutants in the collected 28 samples are Cd and Pb (Page 1, Line 16), while there is no information in the whole manuscript about these two heavy metals. (3) In the Introduction: # (Page 2, Line 22), why in contrast? The two sentences have the same meaning that photocatalysis is a promising solution for water treatment. # (Page 2, Line 29), the sentence for description the nitrogen doped TiO2 is not completed. # (Page 2, Line 33), The number of the wells that drilled with their dimensions can be obtained from El Obour city council and from these information the amount of water can be estimated roughly. This will give an indication for what extent of this environmental problem and help for selecting the prober water treatment technology. # The novelty of this research article is very low, especially author used known and published photocatalytic technique with nitrogen doped TiO2 in bench-scale (Reference: Cong et al., 2007). (4) Materials and Methods: # (Page 3, Line 15) The parameters TH, Cl , NH4+, SO4–, and NO3- were analyzed according to which standard method. # Standard methods is preferred to be reference for the method of determination of COD (Page 3, Line 20). # Authors referred to Cong et al., 2007, for the preparation of nitrogen doped TiO2. They used urea as a source for nitrogen with molar ratio titanium n-butoxide : urea (1:5), which is higher than was studied by Cong et al, 2007. Also, The urea is not the best source of nitrogen as found by Cong et al, 2007. In addition, no further treatment process for the obtained N-doped titania after the hydrothermal process, while authors calcined the obtained powder at 400 °C for 4 h. This will change the crystalline characteristics of the final product totally. Authors did not explain why they changed the preparation method that established by Cong et al, 2007. # In Photocatalytic Reactions Section,

holes are not the only oxidizing species in the process, what about the hydroxyl radicals and the super oxide oxygen?. (5) Results and Discussion # (Page 4, Line 23), the acceptable values of pH, Mg2+, and K+ are not sufficient to mention that more than 90% of samples could be used for drinking. This sentence must be rephrased. # (Page 5, Line 11), the Fig. number is not correct, it is 4. # (Page 4, Line 15) this paragraph did not mention the exact main source of bacterial contamination of the shallow ground water. # The visible light lamps with wavelength 400–700 nm range were used for the photocatalytic degradation process and this is not fair for showing the effect of the photocatalyst. This catalyst can be activated also in UV range from 300 nm as the solar light start from this wavelength and authors mentioned that this process can be done by solar light (see Abstract and Conclusions Sections). (6) The recommended treatment process was done in bench-scale with only 4 collected samples at fixed operation time (60 min). There is no information about the reaction kinetics. In addition, authors did not treat the problem of scaling up this heterogeneous photocatalytic process with large water volume, especially they mentioned that there are plenty of wells in the City. In addition, what about the cumbersome separation method of the nano-catalyst from the treated effluent. (7) The number of references (51) is so high for research article.